LKG - POL Mine dewater Study 1407

Northrop Hatton & Taylor

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Authorized by: SC

Date: 6/25/13

15 September 1981

MEMO TO: Ron Solimon, Pueblo of Laguna
Pat Wise, Pueblo of Laguna
Frank Jones, Bureau of Indian Affairs
Marc Nelson, U.S. Geological Survey

FROM: Hydro Geo Chem, Inc.

SUBJECT: Progress of work on Laguna Pueblo: August, 1981.

Monitoring Program. We have not received any comment on the preliminary monitoring evaluation. We have added two considerations to the monitoring recommendations. First, that combination staff-crest gauges be emplaced at the stream quality monitoring stations. These are rugged, inexpensive gauges with no moving parts; they are unobtrusive and less proven to vandalism. Second, that groundwater be monitored at two sites: Well 79-1 should be completed as a multiple piezometer (Morrison Formation, Dakota Sandstone), and Conoco well WW-102 should have a pressure gauge installed.

Tracer Test. Bruce Gallaher of EID informed us that the sample collection must be put off until October. Given a one month sample analysis period, and two months for interpretation of the results and writing the final report, the test may not be completed until mid-January. As soon as we find out exactly when the sampling will take place we will request a project extension for this portion of the contract.

Geochemistry. Results of ^{14}C sampling in the Rio Puerco Fault Belt were received. The interpretation is not complete but the age date supports the hypothesis of fairly old (>10,000 years) Morrison water mixing with essentially dead (>35,000

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years) Permian water.

Numerical Modeling. Calibration of the steady-state model is essentially complete, except for layer 5 (Mancos Shale), where there are convergence problems. We are experimenting with the S.I.P. iteration parameters to obtain convergence. If this does not work we will replace layer 5 with a no-flow boundary.

The transient simulations are presently being run independantly of the steady-state model. For these we are using a smaller 2-D model that allows more accurate modeling of actual mine-site conditions as well as conditions basin-wide. The model approximates conversion from artesian to water table conditions; it is superior to the closed-form analytic solutions of Moench and Prickett because it allows, through node spacing, variable diameter pumping areas. The transient simulations for each mining area will be compared to drawdowns from some hypothetical pumping well for fully artesian conditions. These 'equivalent' wells will then replace each mine area in the 3-D model, where effects of boundaries and leakage can be more accurately simulated. Pumping and drawdowns from these areas will then be assessed on a per mine area and per unit production (for example, in increments of 1000 gpm).